APPENDIX E

GEOTECHNICAL REPORTS

Taber
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September 10, 2002

Mr. Bob Eynck
Martin, Rivett & Olson, Inc.
2200 B Douglas Boulevard, Suite 150
Roseville, California 95661-3878

Subject: **Geotechnical Roadway Study**
Auburn Rancheria Project — 2P2/300/272-2
Placer County, California — 38121-G3-245N;208W

Dear Mr. Eynck:

This report presents the results of our roadway evaluation for the subject project. This report incorporates previous roadway work by this office as presented in our reports of "Roadway Subgrade Evaluation, Auburn Rancheria Casino", dated May 10, 2001, and "Geotechnical Roadway Investigation, Foothills Boulevard and Sunset Boulevard Extensions", dated September 13, 2001.

Deflection testing was performed as part of this work by CHEC Consultants along portions of Athens and Industrial Avenues. Their report, dated August 13, 2002, was submitted previously.

Limitations of this study are discussed in the attached "General Conditions."

PROJECT DESCRIPTION

The project is understood to include the following roadway elements:

- Reconstruct/widen approximately 3000 ft of Athens Avenue from Industrial Avenue to the new Foothills Boulevard extension
- Overlay/widen approximately 2300 ft of Industrial Avenue, extending about 1000 ft north and 1300 ft south of Athens Avenue
- Construct approximately 2600 ft of new Sunset Boulevard extension west from Cincinnati Avenue
- Construct about 8200 ft of new Foothills Boulevard extending north from the west end of the Sunset Boulevard extension to Athens Avenue.

The project limits are shown on Figure-1, attached. A Traffic Index of 10 has been indicated for all road sections associated with this project. Project cuts/fills are expected to be relatively minor, with maximum heights of about 5 ft.

Athens Avenue

The existing Athens Avenue section is approximately 28 ft wide, including 3-ft shoulders on both sides. The existing pavement section is indicated from County records to consist of 0.50 ft AC, 0.33 ft Cl-2 AB and 0.80 ft lime-treated subgrade. Pavement cores by CHEC indicate up to 7 inches (0.58 ft) of AC over the AB section. The existing pavement condition is good with no significant distress or cracking. Deflections recorded by CHEC were generally within tolerable limits at a design T.I. of 10.

This road will be widened predominately on the north side to a full section width of 65 ft. New profile grade will be established as much as 1.5 ft above existing grade. To best accommodate the new profile grade, it is proposed to remove the existing AC section, add AB to meet new AC subgrade, and place new AC to finish grade. A new structural section established on native subgrade will be constructed for the widening. Several culverts are expected to be extended and/or replaced along Athens Avenue.

Industrial Avenue

The existing Industrial Avenue section is approximately 22 ft wide with no shoulders. Pavement condition is locally poor with significant cracking.

The majority of the existing road is comprised of 0.20 ft AC over PCC. Deflection test results within the PCC limits are within tolerable limits, although pavement rehab is recommended by CHEC to control reflective cracking. Along both sides of the road, the original PCC section has been widened by about 2 ft with a section comprised of 0.30 ft AC on AB; in these areas, pavement deflections were much higher (well above tolerable limits) and reconstruction has been recommended.

The original PCC section is interpreted as original state highway constructed circa 1930's. The depth of concrete is not known, but typical construction practice is understood to have included 11 ft slab sections of thickness 8.5 inches (possibly thickened along the edges). It is proposed to widen this road along the east side to a new width of 65 ft, with the widened portion consisting of a new flexible pavement section established on native subgrade. New profile grade south of Athens Avenue is indicated to be fixed to the existing grade; north of Athens Avenue, the new grade will be up to 1.0 ft above existing. Several culverts may be extended and/or replaced along this section, including extension of a concrete box culvert north of Athens.

Sunset/Foothills Boulevards

The new Sunset Boulevard extension alignment is indicated to be unchanged from that discussed in our September 13, 2001 report. The new Foothills Boulevard alignment is approximately 1400 ft west of the alignment addressed in the September 13, 2001 report. The present alignments are shown on Figure-1. Both the Sunset and Foothills segments are expected to be constructed with lime-treated subgrade.

STUDY PROCEDURES

Supplemental study made for this report included the following:

- Pavement cores and deflection studies along Athens and Industrial Boulevards (by CHEC Consultants)
- Four supplemental R-value tests and three soils corrosivity tests along Athens and Industrial Boulevards
- Evaluation of existing pavement sections with recommended pavement design for overlay and/or reconstruction
- Evaluation of new pavement structural sections for proposed road widening (Athens and Industrial) and new alignment segments (Sunset and Foothills)

Supplemental R-value and corrosivity tests along the new Foothills Boulevard alignment are in-process and will be reported separately. The recommendations contained herein for the Foothills segment are based on data obtained from the earlier (September 2001) study and conservative assumptions for lime-treat subgrade based on our experience with similar soils.

For completeness of presentation, all boring logs and laboratory test results are included with this report, attached as Figures 2 and 3.

SITE SOILS AND TEST RESULTS

Site soils obtained for this study were found to be consistent with previous site studies and are comprised of very firm silty clay, clayey sand and sandy silt. Most of these materials are fine-grained (>50% passing No 200 sieve) and are classed as "CL" per Uniform Soils Classification.

Results of the R-value tests, from both this and previous studies, range from R=11 to R=29 along the Athens/Industrial segments, and R=6 to R=14 along the Sunset and (previous) Foothills segments. Exception to these results was an R=64 near the proposed intersection of Foothills and Athens (from a sample with significantly less clay content).

Soil corrosivity results, from both this and previous studies, are within the following ranges:

pH	5.6-6.9.
Minimum Resistivity:	1390-3480 ohm-cm
Chloride:	7.3-15.4 ppm
Sulfate:	4.6-36.3 ppm

RECOMMENDATIONS

Grading/Subgrade Preparation

Project grading is expected to be performed in accordance with Caltrans "Standard Specifications", including Section 19. Grading should include stripping and disposal of the surficial vegetation layer (estimated to depth 3-4 inches), and reprocessing of underlying disturbed soils -- estimated to an additional depth of 8± inches. Based on the boring data, no difficulties are anticipated in excavating native soils to proposed roadway grades with typical "heavy-duty" construction equipment.

Subgrade preparation consistent with Caltrans "Standard Specifications" requires at least 95% relative compaction (per CTM 216), or equivalent, on materials to 30-inches below finished pavement grade. With the anticipated pavement sections (per below), this is expected to be generally achieved by scarifying the exposed subgrade to depth 6 inches and compacting these materials to 95% relative compaction.

Cuts/Fills

New project cut/fill slopes at design slopes of 1½h:1v are considered appropriate for anticipated slope-heights of 5 ft or less. Bare slopes should be protected from erosion by vegetation or other appropriate means.

New embankment placed below 30-inches of finish grade should be placed to at least 90% relative compaction. Comparison of laboratory tests with in-place dry densities suggests an overall shrinkage from cut to fill in the range of 4-6%. Some additional loss (1-2%) is estimated due to transportation and other construction handling. Actual amount of shrinkage will depend on the degree of compaction effort achieved in construction; compaction greater than 90% would result in somewhat higher overall earthwork shrinkage.

Pavement Sections

A number of pavement design options and alternatives have been discussed during preliminary design meetings with Martin, Rivett & Olson. Based on these discussions, and the desire to expedite construction, the following pavement sections have been developed for this project. Other options are available and can be discussed, if desired.

The pavement sections for Sunset and Foothills Boulevards are based on R=6 for native soil and R=50 for lime-treated subgrade. Confirmation of these results will be submitted upon completion of the R-value testing.

Athens Avenue

Existing pavement:

- Mill existing AC to AB
- Scarify and compact exposed AB to 95% relative compaction (per CTM-216)
- Place additional AB, as needed, to meet new profile grade
- Place 0.8 ft AC to finish grade

New pavement in widened areas: (Basement R=11)

- 0.50 ft DGAC
- 1.80 ft Cl-2 AB

Alternative Widened Section:

- 0.50 ft DGAC
- 0.80 ft Cl-2 AB
- 1.00 ft Lime-treat subgrade*

Industrial Avenue

Existing pavement where new profile grade is <0.9 ft above existing grade:

- Mill existing AC to PCC
- Crack and seat PCC into blocks no smaller than 3 ft dimension
- Place layer of paving fabric, overlain by 0.35 ft dense-grade asphalt concrete (DGAC)
- Alternatively, 0.20 ft rubberized AC can be used in place of DGAC and fabric
- Widened edge adjacent to PCC: remove existing AC and construct new structural section consistent with new pavement widening (below)

Existing pavement where new profile grade is >0.9 ft above existing grade:

- Place minimum 0.4 ft AB over existing AC as a cushion-course
- Place 0.5 ft DGAC over AB

New pavement in widened areas: (Basement R=11)

- 0.50 ft DGAC
- 1.80 ft Cl-2 AB

Alternative Widened Section:

- 0.50 ft DGAC
- 0.80 ft Cl-2 AB
- 1.00 ft Lime-treat subgrade*

*Lime-treat subgrade: 5% lime (by weight) mixed with native subgrade soil; assumed R=50 to be verified by lab testing

Note: The 0.50 ft AC thickness for the new widened section is considered a minimum both to meet design T.I. and provide adequate structural (beam) strength to prevent cracking along the interface with the rigid PCC section. Additional mitigation against deflection cracking can be achieved by placing a strip of high-strength fabric along this interface (e.g., "petro-tec" or similar).

Sunset/Foothills

New pavement: Assume lime-treated subgrade with R=50; Basement R=6

- 0.50 ft DGAC
- 0.80 ft Cl-2 AB
- 1.25 ft Lime-treat subgrade*

Alternative Section:

- 0.50 ft DGAC
- 1.90 ft Cl-2 AB

Soil Corrosivity

Results of soil corrosivity testing (pH, minimum resistivity, chlorides and sulfates) indicate a "non-corrosive" environment as defined by the January 1996 Caltrans "Corrosion Guidelines" publication. As such, no special corrosion considerations with respect to concrete/steel design are required for this project. Indicated sulfate concentrations at 36 ppm or less are not expected to cause significant reaction to the proposed lime-treated subgrade section.

*Lime-treat subgrade: 5% lime (by weight) mixed with native subgrade soil; assumed R=50 to be verified by lab testing

Based on the pH and resistivity test results, the estimated years to perforation for 18 gage steel culverts is in the range of 12-24 years. Design of new steel culverts should also consider site experience and performance of the existing culverts when estimating the service life.

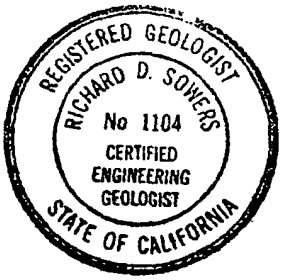
TABER CONSULTANTS

R. D. Sowers
R.C.E. 38788
C.E.G. 1104

RDS/ns

Attachments:

	General Conditions
Figure-1	"Location Map"
Figure-2	"Test Boring Logs" (12 pages)
Figure-3	"Laboratory Test Results" (4 pages)



GENERAL CONDITIONS

The conclusions and recommendations of this study are professional opinion based upon the indicated project criteria and the limited data described herein. It is recognized there is potential for sufficient variation in subsurface conditions that modification of conclusions and recommendations might emerge from further, more detailed study.

This report is intended only for the purpose, site location and project description indicated and assumes design and construction in accordance with Caltrans practice.

As changes in appropriate standards, site conditions and technical knowledge cannot be adequately predicted, review of recommendations by this office for use after a period of two years is a condition of this report.

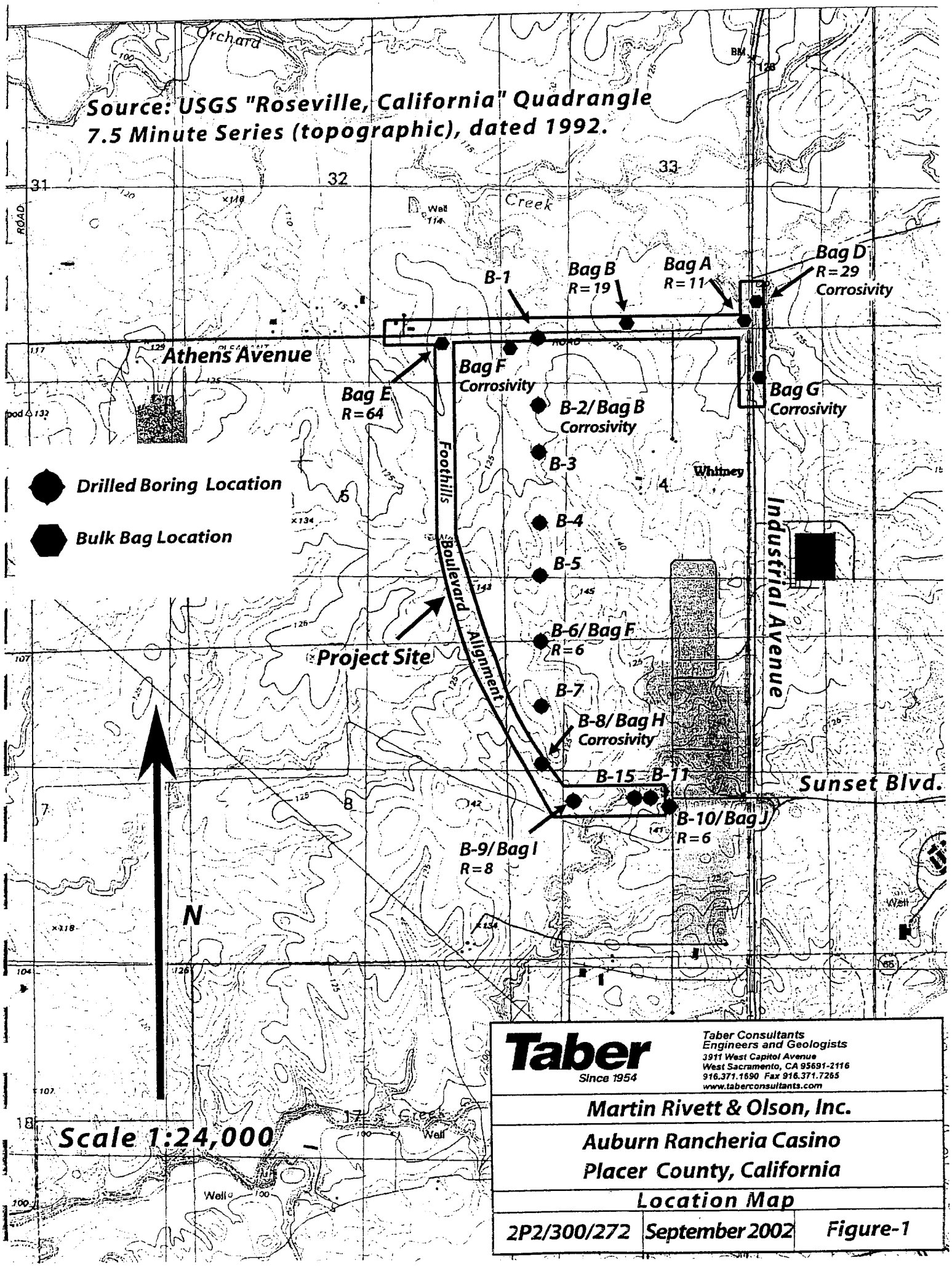
A review by this office of any foundation and/or grading plans and specifications or other work product insofar as they rely upon or implement the content of this report, together with the opportunity to make supplemental recommendations as indicated therefrom is considered an integral part of this study and a condition of recommendations.

Subsequently defined construction observation procedures and/or agencies are an element of work which may affect supplementary recommendations.

Should there be significant change in the project or should soils conditions different from those described in this report be encountered during construction, this office should be notified for evaluation and supplemental recommendations as necessary or appropriate.

Opinions and recommendations apply to current site conditions and those reasonably foreseeable for the described development -- which includes appropriate operation and maintenance thereof. They cannot apply to site changes occurring, made, or induced, of which this office is not aware and has not had opportunity to evaluate.

The scope of this study specifically excluded sampling and/or testing for, or evaluation of the occurrence and distribution of, hazardous substances. No opinion is intended regarding the presence or distribution of any hazardous substances at this or nearby sites.



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Martin Rivett & Olson, Inc.

Auburn Rancheria Casino
Placer County, California

Location Map

2P2/300/272	September 2002	Figure-1

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TEST BORING LOG

2P2/300/272

TYPE: 4-Inch Solid Stem Auger

ELEVATION: 119.9 12.6ft rt., Sta. 78+81.6

BORING No 1

UNCONFINED COMPRESSIVE STRENGTH (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	MOISTURE (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (Inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS	
					Bag	A	5		CL	(Very stiff) to very hard gray light brown fine-medium SANDY CLAY
1.5		93	21	77	1.4	1				
		103	13	50/0.1	1.4	2	10		SC	Very dense gray brown CLAYEY fine-medium SAND to fine-medium SAND with CLAY
							15			No free groundwater encountered. Boring backfilled with native cuttings, 06-18-01.
							20			
							25			
							30			
							35			
							40			

THE BORING LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES

LOGGED BY: K.R.D. | DATE: 06-18-01

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TEST BORING LOG

2P2/300/272

TYPE: 4-Inch Solid Stem Auger

ELEVATION: 121.2 21.6ft rt., Sta. 68+76.4

BORING No 2

UNCONFINED COMPRESSIVE STRENGTH (taf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	MOISTURE (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS	
	Cr				Bag	B	5		CL	(Very stiff) to hard light orange brown fine-medium SANDY SILTY CLAY
4.4		93	29	44	1.4	1				
							10		ML	Dense light brown gray SILT to fine SANDY CLAYEY SILT
3.7		99	24	61	1.4	2				
										No free groundwater encountered. Boring backfilled with native cuttings, 06-18-01.
							15			
							20			
							25			
							30			
							35			
							40			

THE BORING LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES

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TEST BORING LOG

2P2/300/272

TYPE: 4-Inch Solid Stem Auger

ELEVATION: 124.0 10.8ft rt., Sta. 58+67

BORING No 3

UNCONFINED COMPRESSIVE STRENGTH (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	MOISTURE (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS	
	R,G,A				Bag	C				
6.0		117	17	37	1.4	1	5		CL	(Stiff) light brown gray fine-coarse SANDY CLAY
4.2		107	19	83/0.7	1.4	2	10		CL	Hard to very hard SILTY fine-medium SANDY CLAY
							15			No free groundwater encountered. Boring backfilled with native cuttings, 06-18-01.
							20			
							25			
							30			
							35			
							40			

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TEST BORING LOG

2P2/300/272

TYPE: 4-Inch Solid Stem Auger

ELEVATION: 118.5 7.0ft rt., Sta. 47+5.3

BORING No 4

UNCONFINED COMPRESSIVE STRENGTH (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	MOISTURE (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS	
					Bag	D	5		CL / ML	(Very stiff) to very hard light brown gray SILTY fine SANDY CLAY to fine SANDY CLAYEY SILT
5.5		95	28	58/0.5	1.4	1				
							10		SM / ML	Very dense light brown gray SILTY fine SAND/fine SANDY SILT
8.8		116	17	95	1.4	2				
							15			No free groundwater encountered. Boring backfilled with native cuttings, 06-18-01.
							20			
							25			
							30			
							35			
							40			

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TEST BORING LOG

2P2/300/272

TYPE: 4-Inch Solid Stem Auger

ELEVATION: 119.4 6.0ft rt., Sta. 38+52

BORING No 5

UNCONFINED COMPRESSIVE STRENGTH (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	MOISTURE (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS
					Bag	E	5		
		88	30	76/0.8	2.5	1			
6.4		84	40	86	1.4	2			
							10		
2.4		109	16	66	1.4	3			
							15		
							20		
							25		
							30		
							35		
							40		

(Compact) to very dense light brown and gray fine-medium SANDY SILT to very fine-fine SANDY SILT

ML

No free groundwater encountered. Boring backfilled with native cuttings, 06-18-01.

THE BORING LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES

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DATE: 06-18-01

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Since 1954

TEST BORING LOG

2P2/300/272

TYPE: 4-Inch Solid Stem Auger

ELEVATION: 116.0 5.0ft. rt., Sta. 27+46.5

BORING No 6

UNCONFINED COMPRESSIVE STRENGTH (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	MOISTURE (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS	
	R				Bag	F	5		CL	(Very stiff) brown fine-medium SANDY CLAY
5.1		101	23	52	1.4	1			SM / ML	Dense light gray SILTY fine SAND/fine SANDY SILT
5.2		89	33	44	1.4	2	10		CL	Hard light gray SILTY CLAY
							15			No free groundwater encountered. Boring backfilled with native cuttings, 06-18-01.
							20			
							25			
							30			
							35			
							40			

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TEST BORING LOG

2P2/300/272

TYPE: 4-Inch Solid Stem Auger

ELEVATION: 131.5 6.4ft rt., Sta. 16+50.5

BORING No 7

UNCONFINED COMPRESSIVE STRENGTH (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	MOISTURE (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (Inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS	
					Bag	G				(Very stiff) light brown gray fine SANDY SILTY CLAY
5.5		94	30	70	1.4	1	5		SM / SC	Dense light gray SILTY CLAYEY very fine-fine SAND
6.4		102	23	70	1.4	2	10		CL	Hard light brown gray SILTY CLAY with fine SAND
							15			No free groundwater encountered. Boring backfilled with native cuttings, 06-18-01.
							20			
							25			
							30			
							35			
							40			

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TEST BORING LOG

2P2/300/272

TYPE: 4-Inch Solid Stem Auger

ELEVATION: 125.0 5.5ft rt., Sta. 6+50.5

BORING No 8

UNCONFINED COMPRESSIVE STRENGTH (taf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	MOISTURE (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (Inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS
	Cr				Bag	H	5		CL
5.1		106	19	89/0.9	1.4	1			ML
3.5		98	26	75/0.9	1.4	2	10		
							15		
							20		
							25		
							30		
							35		
							40		

(Very stiff) light brown gray SILTY fine SANDY CLAY

Very hard light brown gray and rust very fine-fine SANDY CLAYEY SILT

No free groundwater encountered. Boring backfilled with native cuttings, 06-18-01.

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TEST BORING LOG

2P2/300/272

TYPE: 4-Inch Solid Stem Auger

ELEVATION: 118.0 10.4ft lt., Sta. 6+80.5

BORING No 9

UNCONFINED COMPRESSIVE STRENGTH (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	MOISTURE (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS	
	R,C				Bag	1	5		CL	(Very stiff) to hard light brown fine SANDY SILTY CLAY
7.8		99	27	51	1.4	1				
3.9		105	20			2B	10		ML	Very dense light brown gray very fine-fine SANDY SILT with trace medium SAND
4.1		116	15	75/0.9	1.4	2A				
							15			No free groundwater encountered. Boring backfilled with native cuttings, 06-18-01.
							20			
							25			
							30			
							35			
							40			

THE BORING LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES

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TEST BORING LOG

2P2/300/272

TYPE: 4-Inch Solid Stem Auger

ELEVATION: 115.5 10.0ft rt., Sta. 23+64.6

BORING No 10

UNCONFINED COMPRESSIVE STRENGTH (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	MOISTURE (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS	
	R,C,A				Bag	J	5		SC / CL	Semicompact/stiff brown CLAYEY fine-coarse SAND fine-coarse SANDY CLAY
3.0		124	12	20	1.4	1				
							10		ML	Hard light brown gray very fine-fine SANDY CLAYEY SILT
6.8		95	29	48	1.4	2				
										No free groundwater encountered. Boring backfilled with native cuttings, 06-18-01.
							15			
							20			
							25			
							30			
							35			
							40			

THE BORING LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES

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West Sacramento, CA 95691
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TEST BORING LOG

2P2/300/272

TYPE: 4-Inch Solid Stem Auger

ELEVATION: 114.2 Centerline, Sta. 22+59.5

BORING No 11

UNCONFINED COMPRESSIVE STRENGTH (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	MOISTURE (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS	
		105	20	42	2.5	1	5		SM	(Compact to dense) brown SILTY fine-coarse SAND
9.7		96	28	28	1.4	2				Very stiff to stiff light orange brown gray CLAYEY SILT with fine SAND
2.7		106	21	22	1.4	3	10		ML	
										06-18-01
3.6		99	26	19	1.4	4	15			
							20		CL	Hard orange brown fine-medium SANDY CLAY
5.0		106	21	42	1.4	5				
							25			Boring backfilled with native cuttings, 06-18-01
							30			
							35			
							40			

THE BORING LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES

LOGGED BY: K.R.D.

DATE: 06-18-01

Taber Consultants
Engineers and Geologists
3911 West Capital Ave.
West Sacramento, CA 95691
(916) 371-1690 Fax (916) 371-7285
Since 1954

TEST BORING LOG

2P2/300/272

TYPE: 4-Inch Solid Stem Auger

ELEVATION: 113.7 5.0ft lt., Sta. 21+74

BORING No 15

UNCONFINED COMPRESSIVE STRENGTH (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	MOISTURE (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (Inches)	SAMPLE No.
9.3		118	10	48	1.4	1
					Bag	M
6.3		111	21	32	1.4	2
9.2		103	24	57	1.4	3
6.0		105	22	30	1.4	4
5.9		106	22	54	1.4	5

DEPTH IN FEET: 5, 10, 15, 20, 25, 30, 35, 40

MATERIAL SYMBOL

UNIFIED SOIL CLASS: CL

Hard and very stiff dark to light brown CLAY to CLAYEY SILT and SILTY CLAY

06-21-01

06-21-01

Boring backfilled with native cuttings, 06-21-01.

THE BORING LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES

LOGGED BY: T.A.K

DATE: 06-21-01

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2P2/300/272-2

RESISTANCE VALUE TESTS
(CTM 301)

Specimen No.	Dry Density (pcf)	Moisture (%)	Exudation Pressure (psf)	Expansion Pressure (psf)	"R" Value
Sample: B-6/Bag F (0.5-5.0 ft depth) Tan brown clay					
1	113.9	16.4	486	108	10
2	111.0	17.8	338	48	8
3	106.2	19.9	267	0	5
"R" Value by Stabilometer (300 psi exudation) = 6					
Sample: B-9/Bag I (0.5-5.0 ft depth) Tan brown clay					
1	99.2	23.9	305	52	8
2	97.7	25.4	232	0	6
3	94.3	27.6	136	0	4
"R" Value by Stabilometer (300 psi exudation) = 8					
Sample: B-10/Bag J (0.0-5.0 ft depth) Tan brown clay					
1	113.8	16.3	445	139	16
2	109.6	18.4	339	43	11
3	105.5	20.1	278	0	4
"R" Value by Stabilometer (300 psi exudation) = 6					
Sample: Bag D (0.2-1.5 ft depth) Tan coarse/fine sandy clayey silt					
1	126.3	10.9	494	0	56
2	124.6	11.7	307	0	31
3	122.8	12.5	246	0	15
"R" Value by Stabilometer (300 psi exudation) = 29					

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2P2/300/272-2

RESISTANCE VALUE TESTS
(CTM 301)

Specimen No.	Dry Density (pcf)	Moisture (%)	Exudation Pressure (psf)	Expansion Pressure (psf)	"R" Value
Sample: Bag E (0.3-1.2 ft depth) Brown very fine sandy silt					
1	121.3	10.2	672	183	78
2	120.0	10.9	292	87	63
3	114.2	13.2	127	26	28
"R" Value by Stabilometer (300 psi exudation) = 64					
Sample: Bag A (0.09-0.3± m) Brown sandy clayey silt					
1	127.6	9.1	443	0	38
2	126.9	10.0	318	0	12
3	125.5	10.8	231	0	7
"R" Value by Stabilometer (300 psi exudation) = 11					
Sample: Bag B (0.09-0.4± m) Gray brown sandy silt					
1	125.9	10.1	413	0	45
2	124.3	11.1	271	0	15
3	123.5	12.1	208	0	9
"R" Value by Stabilometer (300 psi exudation) = 19					

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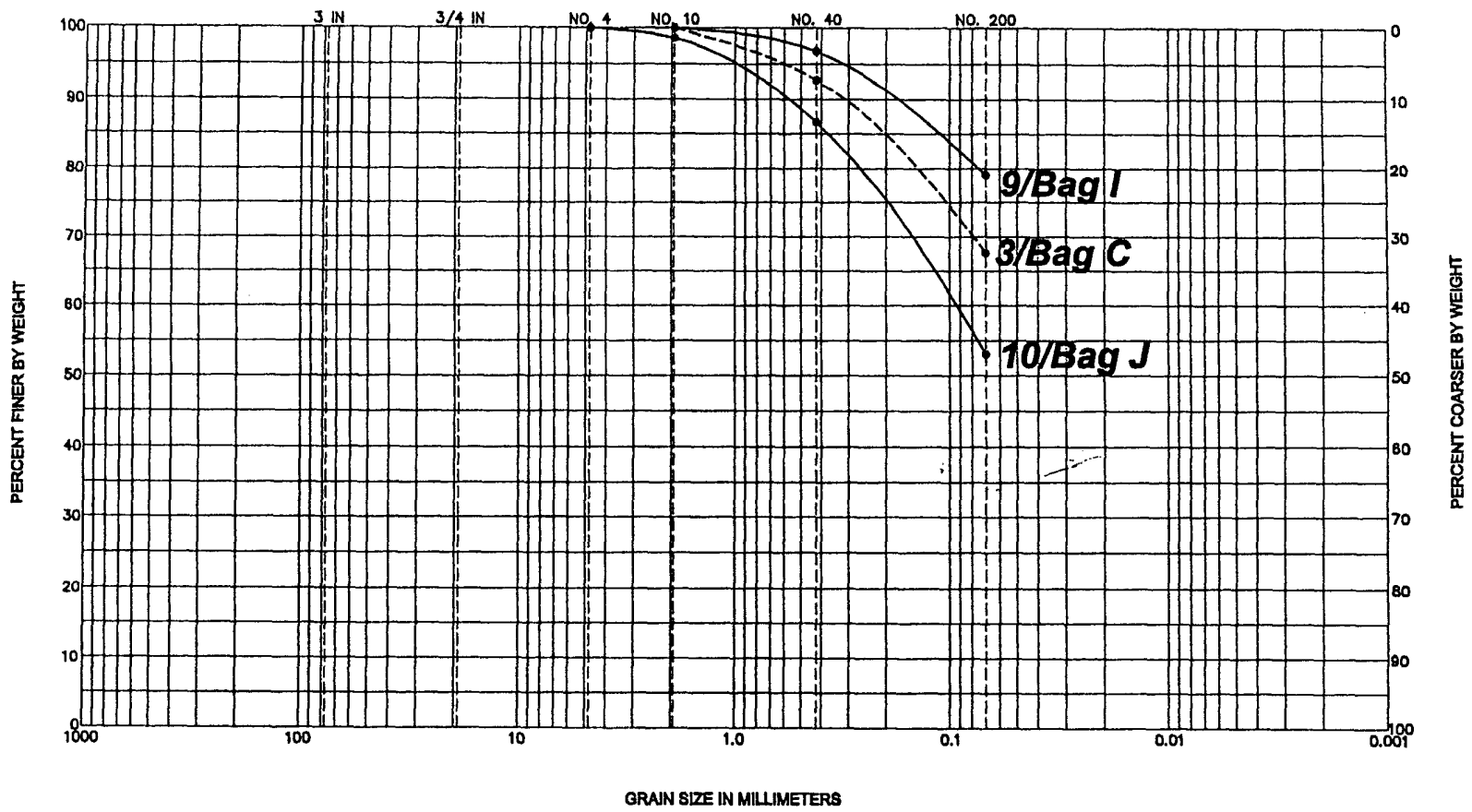
2P2/300/272-2

CORROSIVITY TESTING

Boring/Sample	Soil pH (CTM 643)	Resistivity (CTM 643 Mod.)	Chloride (CTM 422)	Sulfate (CTM 417)
B-2/Bag B	6.26	3480 ohm-cm	7.3 ppm	7.0 ppm
B-8/Bag H	6.44	1420 ohm-cm	12.9 ppm	36.3 ppm
Bag D	5.62	2330 ohm-cm	9.7 ppm	4.6 ppm
Bag F	6.85	1390 ohm-cm	11.0 ppm	8.1 ppm
Bag G	6.94	2220 ohm-cm	15.4 ppm	9.5 ppm

07.18.01 2P2300272m.dwg 1=1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	Coarse	Fine	Coarse	Medium	Fine	

Boring/Sample No.	Depth (ft.)	Classification	NatWC	LL	PL	PI	SE	MDD	OM
3/Bag C	0.5–5.0	CL		31	19	12			
9/Bag I	0.5–5.0	CL/ML							
10/Bag J	0.5–5.0	CL		24	13	11			

GRADATION CURVES

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West Sacramento, CA 95691-2116
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Project Auburn Rancheria Casino

Client Martin, Rivett & Olson

Date June 2001

2P2/300/272

Figure - 3

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FOUNDATION INVESTIGATION

Sunset Boulevard Bridge
Auburn Rancheria Casino
Placer County, California

Placer County
Owner

Martin, Rivett & Olson
Design Engineer

2P2/300/272
38121-G3-245N;186W

August 2001

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FOUNDATION INVESTIGATION

Sunset Boulevard Bridge
Auburn Rancheria Casino
Placer County, California

2P2/300/272

INTRODUCTION

A limited study of foundation conditions has been completed at the above site in accordance with the agreement between Martin, Rivett & Olson, Inc. and Taber Consultants. The purpose of this investigation is to provide earth materials criteria for use in design of proposed new bridge foundations.

Geotechnical study for associated roadway and retaining wall elements of this project are being submitted in a separate report. Limitations of this work are discussed in the attached "General Conditions".

PROJECT DESCRIPTION

The proposed bridge is part of the extension of Sunset Boulevard west of Industrial Avenue, located north of the City of Roseville (see Figure-1). The new bridge crosses a southwest-flowing tributary to Pleasant Grove Creek. The tributary channel at this location occupies a broad, shallow section approximately 375±ft wide and characterized by abundant reeds and cattails. Most of the channel area is at approximate elevation 112, about 2 ft below the adjacent banks. The "main" channel is defined by a 100±ft wide section incised an additional 2 ft, to approximately elev. 110 (about 4 ft below adjacent natural ground). Water in the channel was at about elev. 112 at the time of our field study (July 2001).

The channel gradient is relatively flat and little flow was noted. Channel scour is not indicated to be a significant design issue for this site. Approximately 600±ft downstream of proposed bridge the channel was observed to be partly dammed by wood debris and brush. A high-pressure gas line is indicated to cross the site within 10 ft of the north side of the proposed bridge; depth of this line is unknown.

The new bridge is shown on a "Preliminary Bridge Design" drawing prepared by Martin, Rivett & Olson to be a six-span reinforced concrete flat-slab structure, 200 ft long and 32.7±ft wide, consisting of six equal spans at approximately 33.3 ft each. Preliminary plans show pile-supported diaphragm abutments and 6-column pile-bent extensions, each skewed 40° to match the channel alignment. Deck grade is indicated to be at elev. 118.0, approximately 8 ft above low-channel grade and 4 ft above ground surface at the abutments.

The bridge supports are shown to be located at the following centerline stations:

Abutment-1: Sta. 19+00.00
Bent-2: Sta. 19+33.33
Bent-3: Sta. 19+66.66
Bent-4: Sta. 20+00.00
Bent-5: Sta. 20+33.33
Bent-6: Sta. 20+66.66
Abutment-7: Sta. 21+00.00

At the roadway centerline, the overall channel limits extend from approximately Sta. 17+25 (175±ft west of Abutment-1) to Sta. 21+00 (near Abutment-7). The main channel extends from approximately Sta. 20-21. The west approach will encroach into the shallow channel area west of the main channel, with approach fill to approximate 4 ft depth. No other channel modifications have been proposed as part of this work, and no special environmental constraints on typical bridge foundation construction practice have been indicated.

EXPLORATION AND TESTING

Information on the nature and distribution of subsurface materials and conditions was obtained by means of three logged and sampled augered test borings, supplemented by four impact-driven penetration tests. The sampled test borings were

completed to maximum depth 60.6±ft (elev. 52.8±) using a truck-mounted drill rig at locations outside the channel area. Within the channel area, the penetration tests were driven to depths of 4-12 ft utilizing a track-mounted drill rig.

Soil samples were recovered from the borings by means of a 2.0-inch OD "standard penetration" sampler advanced with standard 350 ft-lb striking force (per ASTM D1586) to provide a field estimate of soils consistency. Sampler penetration resistance is recorded and can be correlated to soils strength and bearing characteristics. The impact cone penetration borings were similarly advanced and provide a continuous profile-record of soil consistency.

The borings were logged and earth materials field-classified by an engineer as to consistency, color, gradation and texture on the bases of sampler penetration resistance, examination of samples and observation of auger cuttings. Groundwater observations were made in the borings during and shortly after completion. The borings were backfilled with native soil cuttings upon completion of drilling operations.

Selected portions of drive samples were retained in moisture-proof containers for laboratory testing and reference. Laboratory testing on selected samples included moisture content-dry density, unconfined compressive strength, and corrosivity tests (pH, minimum resistivity, chlorides and sulfates).

The boring locations were referenced to project stationing as marked in the field by others. Locations, elevations, details of borings and results of tests are shown on the attached "Log of Test Borings" drawing and Figure-2. K. R. Dahl and T. A. Krause were the field engineer-geologists for this study.

EARTH MATERIALS AND FOUNDATION CONDITIONS

The site is shown on published geologic mapping (CDMG "Geologic Map of the Sacramento Quadrangle", 1981) to be underlain by Quaternary age alluvial sediments of the Turlock Lake formation, comprised of silt, sand and gravel. Materials consistent with this designation were encountered in each of the test borings and penetration

tests, underlying a surficial 1-2 ft of disturbed soil outside the channel and below a 2-4 ft thick layer of very soft clay ("muck") within the channel. The channel "muck" is found to generally extend to elev. 110 across the channel, and is estimated to extend to elev. 108 within the central (active) channel.

The underlying bearing unit is described as stiff to very hard silty clay/clayey silt and compact to very dense clayey sand and sandy silt. These materials were penetrated to the maximum depth explored (60.6±ft; elev. 52.8±), and are considered stable and capable of generating support for heavy/intense foundation loads.

The surficial channel "muck" is very weak and compressible under incremental loading; these materials, as well as the surficial 1-2 ft of disturbed soil outside the channel, are not considered capable of sustaining structure or fill foundation loads without reprocessing.

Groundwater was measured in the borings during auger drilling at approximate depths of 10-13 ft (elev. 100.5-103.2±, approximately 9-12 ft below the surface water level in the channel). After drilling, the groundwater levels were observed to rise slowly, and were measured a few feet higher than initially encountered. The groundwater is interpreted as representing slow seepage inflow within the upper 10 ft of the borings. In general, the channel water is interpreted as essentially "perched" over the dense underlying sediments of low permeability and low yield to open excavations. However, moisture-density relationships of the recovered samples suggest the soils to be near saturation, and local zones of relatively high permeability cannot be precluded.

SITE SEISMICITY

The following site seismicity criteria are provided in accordance with current Caltrans Division of Structural Foundations site seismicity evaluation procedures, including "Seismic Design Criteria" (SDC) Version 1.1, July 1999 and with reference to

"Caltrans California Seismic Hazard Map", 1996, and "A Technical Report to Accompany the Caltrans California Seismic Hazard Map", 1996.

Nearest Fault:	Prairie Creek-Spenceville-Dentman (PSD)
Fault Magnitude:	6.5
Fault Type:	Normal
Distance to Site:	11 mi
Peak Bedrock Acceleration (PBA):	0.19g
Soil Profile:	Type C

The site is not within 10 miles of an active fault and no increase in spectral acceleration is indicated per SDC procedures. A design ARS curve per SDC Figure B.4, with M6.5±0.25 earthquake, Type-C soil profile and PBA of 0.2g, is recommended for this site. This SDC curve is attached as Figure-3. Should there be important structural and/or economic considerations associated with more closely defining these values or other site seismicity characteristics, further study would be required.

The potential for soil liquefaction to affect the bridge foundations is considered low due to the overall dense/hard consistency of the underlying soils. The few feet of very soft channel "muck" is susceptible to densification, settlement and/or lateral spreading under conditions of strong ground shaking, but with bridge foundations and approach fill as discussed below, no adverse effects on the structure owing to secondary seismic effects are expected.

CONCLUSIONS

The site is considered stable with support available for the proposed bridge foundations. Conditions are considered suitable for standard (Caltrans) 16-inch cast-in-drilled-hole (CIDH) piling -- consistent with Caltrans Slab Bridge Pile Details (XS 12-55.1) -- achieving bearing in side-friction and end bearing within the dense/hard soils

unit underlying the surficial topsoil and channel "muck". However, since the possibility of free water within drilled excavations cannot be precluded, the use of 24-inch diameter CIDH piles is recommended, thereby allowing for a wet specification option in the event that 16-inch diameter excavations cannot be adequately dried. Casing through the upper 10±ft is expected to provide adequate ground control, and may be required depending on the location/depth of the high-pressure gas main relative to the foundations.

Alternatively, driven concrete or steel pipe piles are considered feasible, but would require pre-drilling as a driving aid to within 5-10 ft of specified tip. Steel "H"-piles could also be considered, especially at abutments or if battered piles are required. Spread footing foundations may be acceptable, but would require affirmed penetration into the dense bearing unit at depth 2-4 ft below channel bottom (generally 6-8 ft below ground surface at most support locations). Each of these alternatives may require specific consideration for protection of the gas main.

Scour is not indicated to be a major design consideration for this site, due to the low gradient and flow velocity. The underlying dense/hard soils (below elevation 108 within the main channel) are considered at least moderately resistant to scour and erosion.

Along the west approach, the 175 ft section of channel between Sta. 17+25 and Sta. 19+00 will be established over several feet of soft/wet channel "muck". This area will require specific consideration with respect to approach fill design and construction, discussed further below.

Results of soils corrosivity testing indicate a "non-corrosive" environment as defined by the January 1996 Caltrans "Corrosion Guidelines" publication. As such, no special corrosion considerations with respect to concrete/steel design are required for bridge foundations.

RECOMMENDATIONS

Bridge Foundations

Based on the above, 24-inch diameter cast-in-drilled-hole (CIDH) concrete piling are recommended for new bridge foundation support. Such piling may be assigned design (service) loads of 45 or 70 tons. All piles should be poured in clean, dry excavations and poured as soon as possible after completion of excavations.

At the bents, casing will be required through the surficial soft/wet channel "muck", and should extend to elev. 100 (approximately 8 ft below low channel bottom). Below this level, only localized seepage is anticipated within open excavations and pumping is considered acceptable for groundwater control. The contractor should, however, be prepared for wet installation should excessive seepage be encountered. Temporary casing may also be required at the abutments for protection of the gas main, depending on position of abutment base relative to the pipeline.

The following Pile Data Table is provided based on 24-inch diameter CIDH piling with 45 ton design loading at abutments and 70 ton loading at bents. The CIDH excavations should be reviewed by a representative of this office to affirm anticipated bearing materials/conditions.

Pile Data Table

Location	Type	Design Loading (service load) (tons)	Nominal Resistance		Cutoff Elevation	Design Tip Elevation	Specified Tip Elevation
			Compression (kips)	Tension (kips)			
Abut-1	CIDH 24"	45	180	90	N/A	85 (1,2); 90 (3)	85 (1,2)
Bents 2 to 6	CIDH 24"	N/A	280	140	110	82 (1,2); 90 (3)	82 (1,2)
Abut-7	CIDH 24"	45	180	90	N/A	85 (1,2); 90 (3)	85 (1,2)

Pile tip elevation is controlled by the following demands: (1) Compression, (2) Tension, (3) Lateral

At bents, scour is assumed to be no lower than elev. 108.

With the use of excavation/backfill details per "Standard Plans" (and per above), active soil pressures on abutment walls may be calculated on the basis of 36 pcf equivalent fluid pressure. Similarly, passive soil resistance of up to 7.7 ksf is available for resistance to seismic loading (reduced for effective wall height less than 8 ft).

Approach Roadway

All materials, grading, original ground preparation and compaction for the approach sections should conform to Caltrans "Standard Specifications", except as specifically modified below. This includes a minimum relative compaction of 95% (per CTM 216) on all materials within the pavement structural section and all fill within 150-ft of bridge abutments. Pavement design by the Caltrans method also presumes 95% relative compaction on all materials within 30-inches of finished grade.

The west approach crosses soft/wet soils extending to depth 2-3 ft below ground surface. It is recommended that these soils be removed to expose a firm surface of underlying dense soil. This surface should be reviewed by a representative of this office to verify uniformity of support prior to receiving fill. Surface water control for the earthwork is considered available by diking, diversion and pumping, as necessary. With this level of preparation, only nominal settlement of the fill and no waiting period for foundation construction is anticipated.

If areas of deeper soft soil are encountered along the west approach, or if the saturated fill foundation is difficult to "work" (e.g., soil "pumping" with repeated equipment passes), then placement of a 1-ft gravel (crushed rock) base with an underlying layer of filter fabric could be utilized to establish a firm working base. A non-woven geofabric (for materials separation and drainage) and/or a layer of biaxial geogrid (for structural reinforcement) could be considered at subgrade level.

Along the east approach, new fill is expected to be founded within dense native soil present at shallow depth (within 1-2 ft of ground surface). Fill foundation preparation in this area should include removal of the surficial soft/loose soil and scarification/compaction of the exposed surface to at least 90% relative compaction (to 95% within 30 inches of finished grade).

Structure Backfill is required behind bridge abutments to the minimum dimensions as shown on Caltrans "Standard Plans". The acceptability of local borrow for use as Structure Backfill should be verified by laboratory testing and field observation of the borrow exposures.

TABER CONSULTANTS

R. D. Sowers
C.E.G. 1104
R.C.E. 38788

REGISTERED GEOLOGIST
RICHARD D. SOWERS
No. 1104
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

August 20, 2001

Attachments:

"General Conditions"
Figure-1 "Vicinity Map"
Figure-2 "Corrosivity Test Results"
Figure-3 "ARS Curve" (per SDC Figure B.4)

"Log of Test Borings" (2 Sheets)

REGISTERED PROFESSIONAL ENGINEER
RICHARD D. SOWERS
No. 38788
Exp. 3-31-05
CIVIL
STATE OF CALIFORNIA

GENERAL CONDITIONS

The conclusions and recommendations of this study are professional opinion based upon the indicated project criteria and the limited data described herein. It is recognized there is potential for sufficient variation in subsurface conditions that some modification of conclusions and recommendations might emerge from further, more detailed study.

This report is intended only for the purpose, site location and project description indicated and assumes design and construction in accordance with Caltrans practice.

As changes in appropriate standards, site conditions and technical knowledge cannot be adequately predicted, review of recommendations by this office for use after a period of two years is a condition of this report.

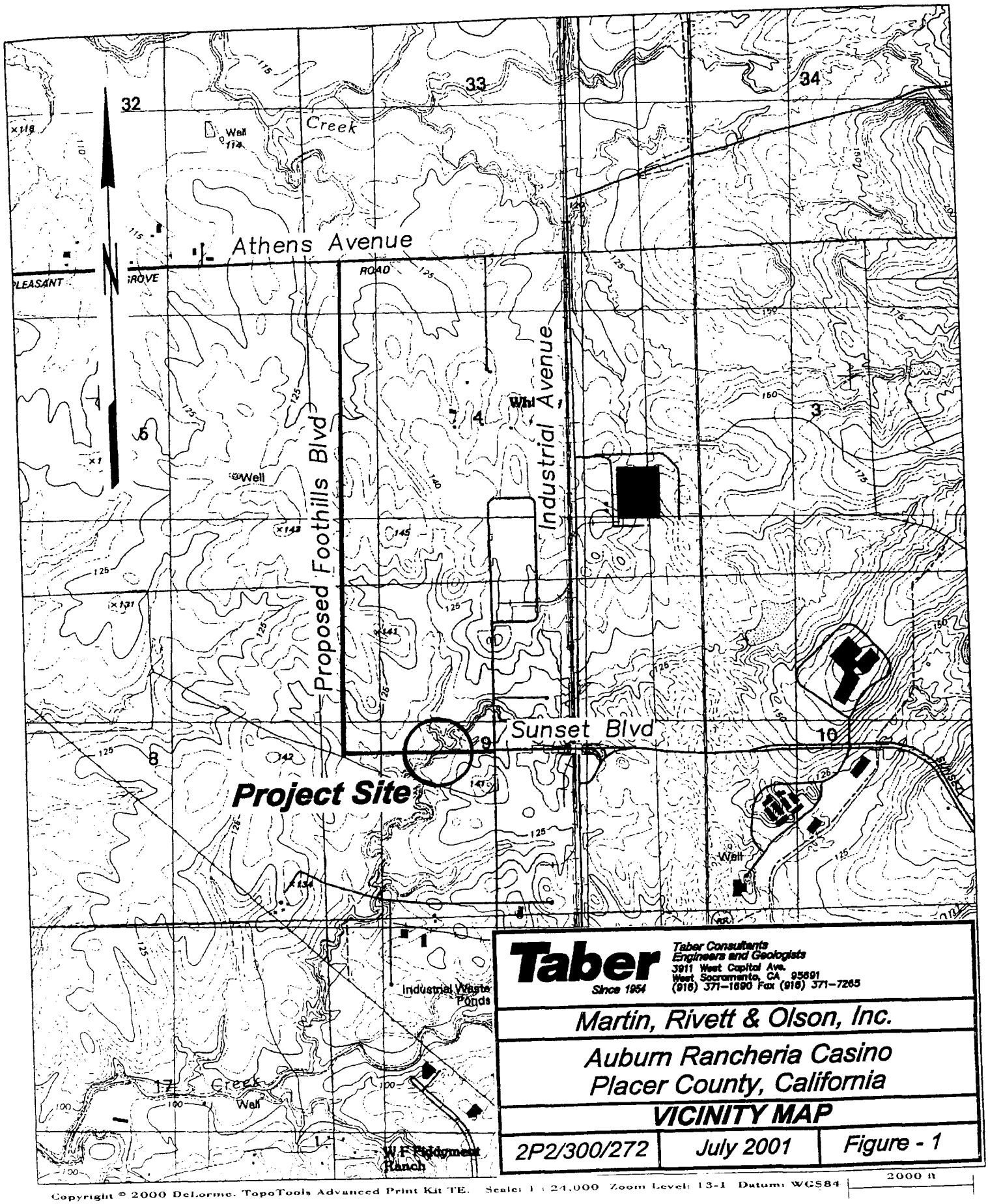
A review by this office of any foundation and/or grading plans and specifications or other work product insofar as they rely upon or implement the content of this report, together with the opportunity to make supplemental recommendations as indicated therefrom is considered an integral part of this study and a condition of recommendations.

Subsequently defined construction observation procedures and/or agencies are an element of work that may affect supplementary recommendations.

Should there be significant change in the project, or should earth materials or conditions different from those described in this report be encountered during construction, this office should be notified for evaluation and supplemental recommendations as necessary or appropriate.

Opinions and recommendations apply to current site conditions and those reasonably foreseeable for the described development--which includes appropriate operation and maintenance thereof. They cannot apply to site changes occurring, made, or induced, of which this office is not aware and has not had opportunity to evaluate.

The scope of this study specifically excluded sampling and/or testing for, or evaluation of the occurrence and distribution of hazardous substances. No opinion is intended regarding the presence or distribution of any hazardous substances at this or nearby sites.



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West Sacramento, CA 95691
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Martin, Rivett & Olson, Inc.

Auburn Rancheria Casino
Placer County, California

VICINITY MAP

2P2/300/272	July 2001	Figure - 1

 Scale: 1 : 24,000 Zoom Level: 13-1 Datum: WGS84 2000 ft

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CORROSIVITY TESTING

Boring/Sample	Depth (ft.)	Soil pH (CTM 643)	Minimum Resistivity (CTM 643 Mod.)	Chloride (CTM 422)	Sulfate (CTM 417)
B-2/Bag B	0-5.0	6.26	3480 ohm-cm	7.3 ppm	7.0 ppm
B-8/Bag H	0-5.0	6.44	1420 ohm-cm	12.9 ppm	36.3 ppm

Figure-2

SDC: ARS Curve

Sunset Blvd. Bridge at Pleasant Grove Creek Tributary

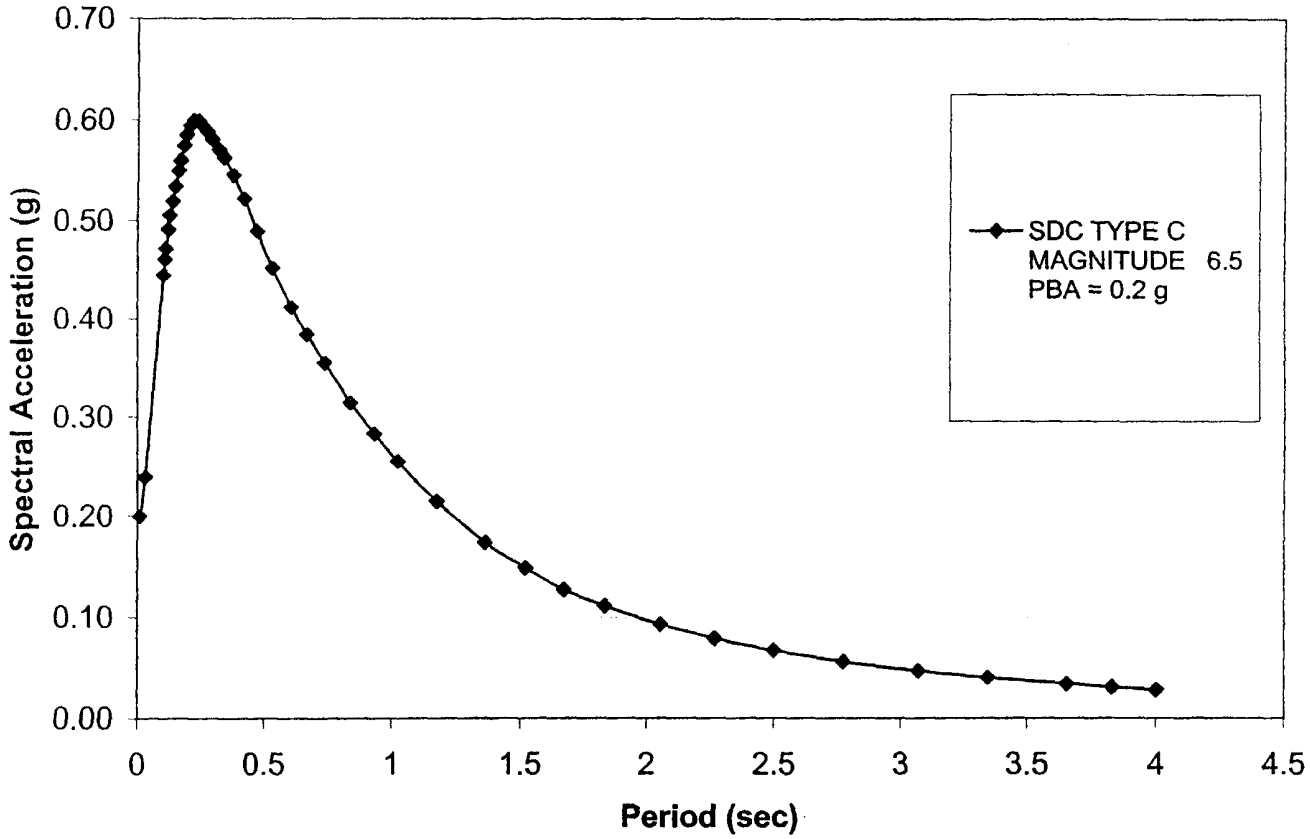

Figure-3

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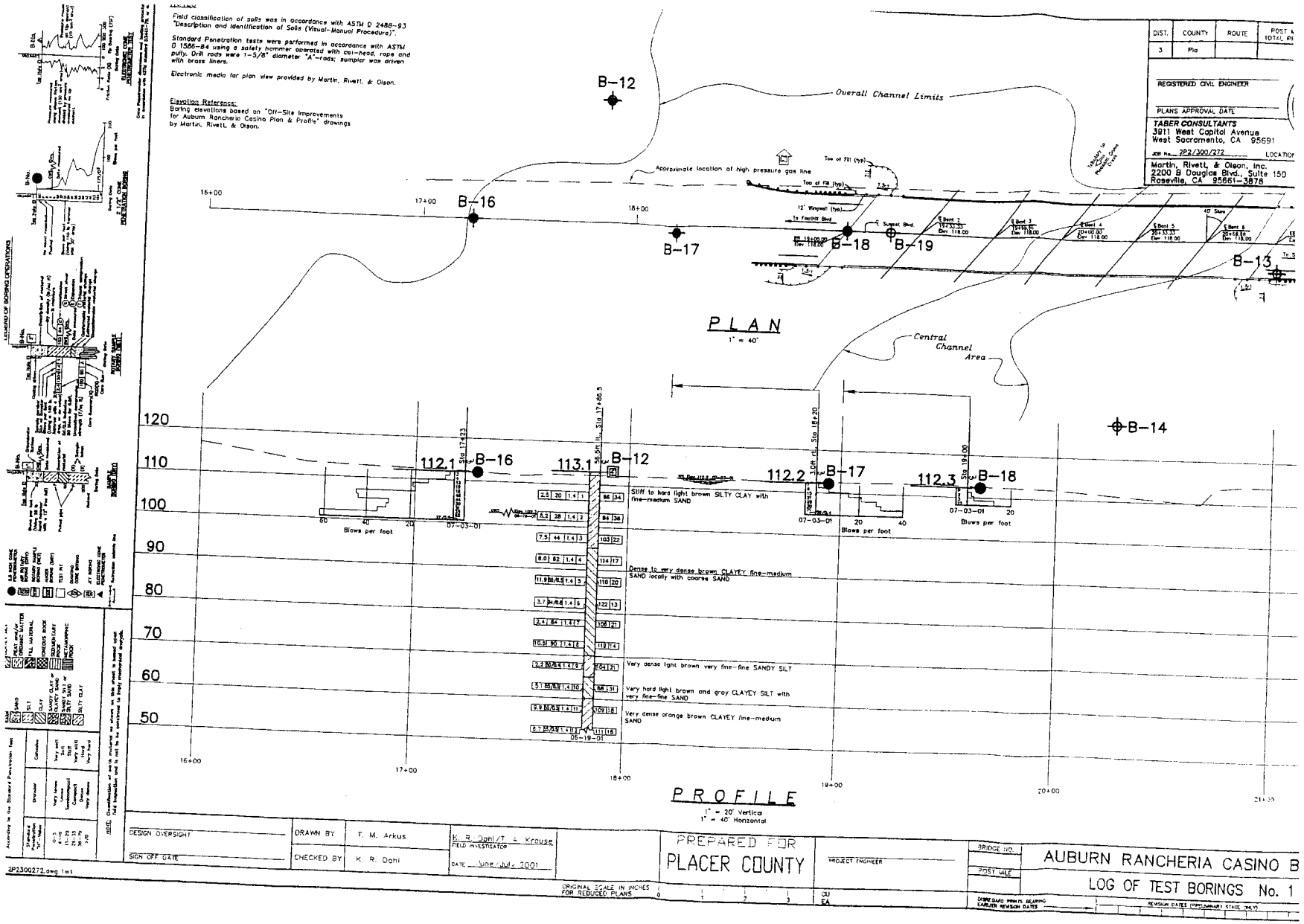

Field classification of soils was in accordance with ASTM D 2488-93 "Description and Identification of Soils (Visual-Manual Procedure)".
Standard Penetration tests were performed in accordance with ASTM D 1586-84 using a safety hammer operated with cat-head, rope and pully. Drill rods were 1-5/8" diameter "A" rods; sampler was driven with brass liners.
Electronic media for plan view provided by Martin, Rivett, & Olson.
Elevation Reference:
Boring elevations based on "Off-Site Improvements for Auburn Rancheria Casino Plan & Profile" drawings by Martin, Rivett, & Olson.
B-12
B-16
B-17
B-18
B-19
B-13
B-14
Overall Channel Limits
Approximate location of high pressure gas line
Central Channel Area
PLAN
1" = 40'
112.1
113.1
112.2
112.3
Stiff to hard light brown SILTY CLAY with fine-medium SAND
Dense to very dense brown CLAYEY fine-medium SAND locally with coarse SAND
Very dense light brown very fine-fine SANDY SILT
Very hard light brown and gray CLAYEY SILT with very fine-fine SAND
Very dense orange brown CLAYEY fine-medium SAND
Blows per foot
PROFILE
1" = 20' Vertical
1" = 40' Horizontal
DIST. 3
COUNTY Pla
ROUTE
REGISTERED CIVIL ENGINEER
PLANS APPROVAL DATE
TABER CONSULTANTS
3911 West Capitol Avenue
West Sacramento, CA 95691
Martin, Rivett, & Olson, Inc.
2200 B Douglas Blvd., Suite 150
Roseville, CA 95661-3878
DESIGN OVERSIGHT
SIGN OFF DATE
DRAWN BY T. M. Arkus
CHECKED BY K. R. Dahl
K. R. Dahl / T. K. Krause
FIELD INVESTIGATOR
DATE June/July 2001
PREPARED FOR
PLACER COUNTY
PROJECT ENGINEER
BRIDGE NO.
POST MILE
AUBURN RANCHERIA CASINO B
LOG OF TEST BORINGS No. 1
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
2P2300272.dwg 1of1

NOTES

Field classification of soils was in accordance with ASTM D 2488-93 "Description and Identification of Soils (Visual-Manual Procedure)"

Standard Penetration tests were performed in accordance with ASTM D 1586-84 using a safety hammer operated with cat-head, rope and pully. Drill rods were 1-5/8" diameter "A"-rods; sampler was driven with brass liners.

Electronic media for plan view provided by Martin, Rivett, & Olson.

Elevation Reference.
Per centerline station elevations per "Off-Site Improvements for Auburn Rancheria Casino Plan & Profile" drawing by Martin, Rivett, & Olson.

DIST.	COUNTY	ROUTE
3	Pla	

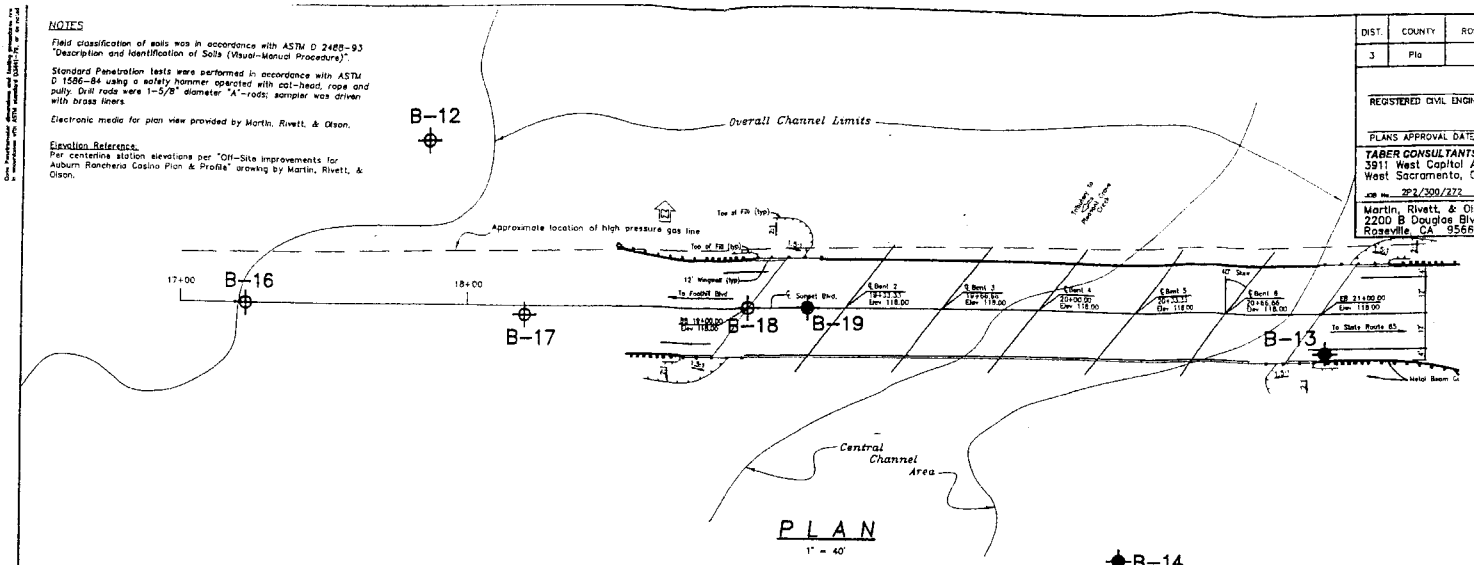
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

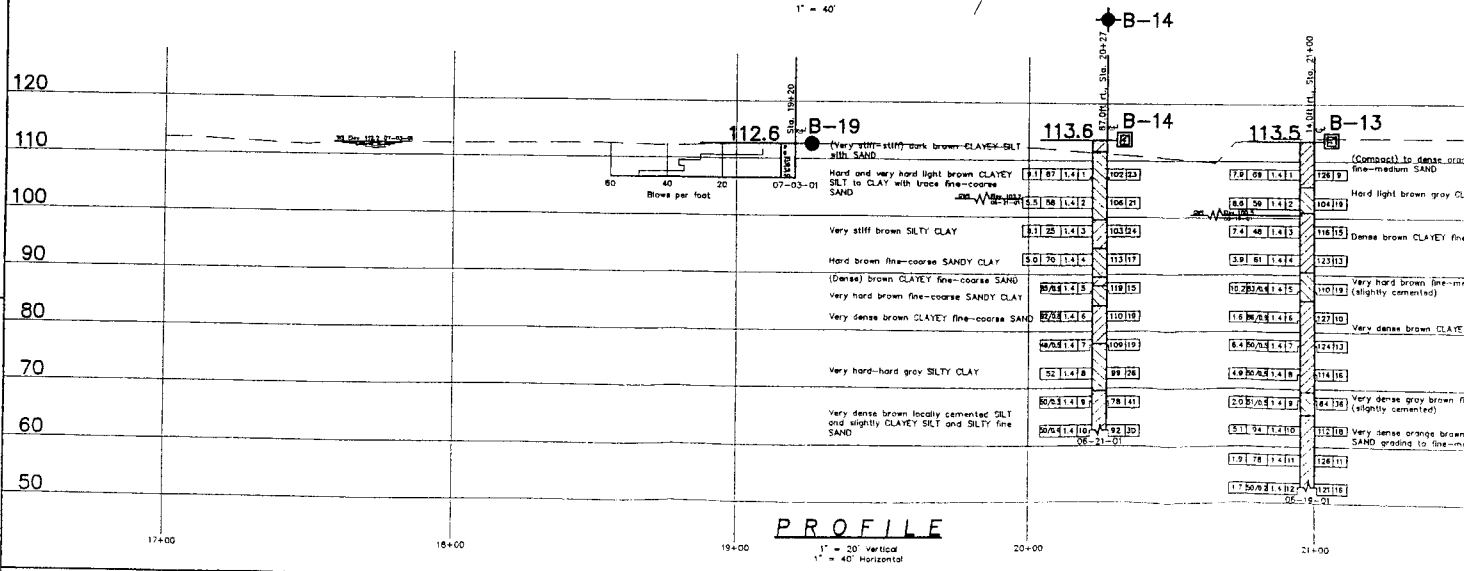
TABER CONSULTANTS
3911 West Capitol Avenu
West Sacramento, CA

JOB No. 2P2/300/272

Martin, Rivett, & Olson,
2200 B Douglas Blvd., S
Roseville, CA 95661-3



PLAN
1" = 40'



PROFILE
1" = 20' vertical
1" = 40' Horizontal

DESIGN OVERSIGHT	DRAWN BY	T. M. Arkus	K. P. Dahl / T. A. Krouse FIELD INVESTIGATOR	PREPARED FOR		BRIDGE NO.	AUBURN RANCHERIA CA
SIGN OFF DATE	CHECKED BY	K. R. Dahl	DATE June / July 2001	PLACER COUNTY	PROJECT ENGINEER	POST MILE	LOG OF TEST BORINGS

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1/2 1 2

DISREGARD PRINTS BEARING EARLIER REVISION DATES

WITHDRAW DATES FOR PRELIMINARY STAG

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October 15, 2002

Mr. Dennis Pecchia
Martin, Rivett & Olson, Inc.
2200 B Douglas Boulevard, Suite 150
Roseville, California 95661-3878

Subject: **Foundation Investigation - Addendum**
Sunset Boulevard Bridge — 2P2/300/272
Auburn Rancheria Casino — 38121-G3-245N;186W
Placer County, California

Dear Mr. Pecchia:

The following are supplemental design data developed for the project as presently envisioned. Reference is made to our original report of "Foundation Investigation", dated October 5, 2001.

Bridge Description

The original bridge was proposed as a six-span reinforced concrete flat-slab structure, 200 ft long and 32.7±ft wide. The bridge as presently proposed is a 7-span precast voided slab bridge of length 460 ft and width 72 ft. The east abutment remains fixed from the original location, with the west abutment shifted 260-ft westerly. New project stationing shows the west abutment (A-1) at Sta. 215+97 and the east abutment (A-8) at Sta. 220+57. The additional bridge length will entirely span the channel as shown on the Log of Test Borings drawing.

New bridge construction will be influenced by a fast-track schedule, with work in the channel prohibited until after April 15, 2003, and the bridge scheduled for completion by June 15, 2003. To accomplish this, precast concrete piles are considered most appropriate for new foundations, instead of CIDH as proposed in the original foundation report. Octagonal 16-inch sections with 45-ton design loading have been proposed for use at the abutments; octagonal 24-inch sections with 100-ton design loading have been proposed at the bents.

Supplemental Exploration

A supplemental test boring (B-23) was drilled at the new west abutment, extended to depth 60 ft. The log of this boring, along with laboratory test results, is shown on the attached revised "Log of Test Borings" drawings.

Recommendations

The proposed 16 inch and 24 inch diameter precast concrete piles may be assigned up to 45 tons and 100 ton design (service) loads, respectively. All piling should be specified to be driven to or below elevation 85 as indicated on the Pile Data Table (attached as Table-1) and have full design bearing per the Engineering News formula at final penetration.

Hard driving is expected at levels below channel bottom (approximate elev. 110), and pre-drilling as a driving aid (i.e., drilled hole diameter less than least horizontal diameter of pile) is considered permissible to elev. 100 at all locations. Deeper pre-drilling, if necessary, may be permissible upon review by this office, provided that the piles achieve a minimum 10 ft penetration into the bearing material with an impact hammer. Driving "refusal" can be defined as piles obtaining 2 times formula bearing for the last foot, or 3 times formula bearing for the last 3 inches. Jetting should not be permitted for this project.

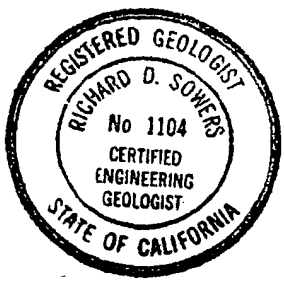
The indicated design tip elevations for lateral capacity are based on a minimum 15-ft penetration into the dense soils. Recommended soil parameters for use in lateral pile analyses (e.g., Lpile or COM-624) are shown on Table-2. For design as columns in bending, bent piles can be considered as having full soil support below elev. 110. Pre-drilled holes are expected to stand without substantial overbreak, and only minimal reduction in pile stiffness is anticipated as a result of pre-drilling.

Please call if you have any questions on the above.

Very truly yours,
TABER CONSULTANTS

R. D. Sowers

Attachments:
"Table 1: Pile Data Table"
"Table 2: "Soil Parameters"(Lateral Pile Analyses)
"Log of Test Borings No. 1"
"Log of Test Borings No. 2"



Distribution: Client (6)

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TABLE-1
Pile Data Table

Location	Pre-cast Prestressed Concrete Piles	Design Loading (service load) (Tons)	Nominal Resistance		Design Tip Elevations	Specified Tip Elevation
			Compression (Kips)	Tension (Kips)		
Abut-1	16 inch Octagonal	45	180	0	85.0 (1); 93.0 (3)	85.0
Bents 2-7	24 inch Octagonal	100	400	0	85.0 (1); 93.0 (3)	85.0
Abut-8	16 inch Octagonal	45	180	0	85.0 (1); 93.0 (3)	85.0
Pile tip elevation is controlled by the following demands: (1) compression, (2) tension and (3) lateral Pre-drilling 16 & 24 inch diameter holes permitted to elev. 100.0 per Caltrans Standard Specifications, Sec. 49-1.05						

TABLE-2
Soil Parameters

Elevation	Soil Type	Buoyant Unit Weight (pcf)*	ϕ	Cohesion (psf)	Soil Modulus ("k")	Soil Strain Parameter E50
110 to 95	Stiff to hard clay	60	--	4000	1000 pci	0.005
95 to 52	Dense sand	73	40°	--	125 pci	--
* Based on groundwater levels at elev. 103						

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November 6, 2002

Mr. Pankaj Prasad, P.E.
Martin, Rivett & Olson, Inc.
2200 B Douglas Boulevard, Suite 150
Roseville, California 95661-3878

Subject: **Foundation Investgation – Addendum No. 2** 2P2/300/272
Sunset Boulevard Bridge
Auburn Rancheria Project
Placer County, California

Dear Mr. Prasad:

It is our understanding that you desire to increase bent pile design loads from 100 tons (as referenced in our letter of "Foundation Investigation – Addendum", dated October 15, 2002) to 150 tons. A total of 10 piles per bent (utilizing 24 inch octagonal sections) are anticipated at 150 tons per pile.

Adequate soil support is considered available for the proposed piling with design loads to 150 tons. It is recommended that the specified tips for such piles be lowered from elev. 85 to elev. 83. The discussion regarding anticipated hard driving and pre-drilling, as discussed in the referenced addendum letter, remain applicable. A revised Pile Data Table is attached as Table-1.

The significantly heavier load per pile has the effect of reducing pile redundancy (i.e., effectively placing higher reliance on each pile). In addition, the Engineering New Formula is not as reliable of an indicator for evaluating pile capacity where significantly "non-standard" piles are used. For these reasons, it is recommended that the capacity of at least the initial pile(s) be verified by a static load test or dynamic test (e.g., CAPWAP analysis.) An abutment pile near the channel is considered appropriate for this test. Tip elevations, casting lengths and acceptance criteria for the remaining piles can be based on the results of this test.

Please call if you have any questions on the above or as we may be of further assistance.

Very Truly Yours,
TABER CONSULTANTS

R. D. Sowers
R.C.E. 38788

REGISTERED PROFESSIONAL ENGINEER
RICHARD D. SOWERS
No. 38788
Exp. 3-31-05
CIVIL
STATE OF CALIFORNIA

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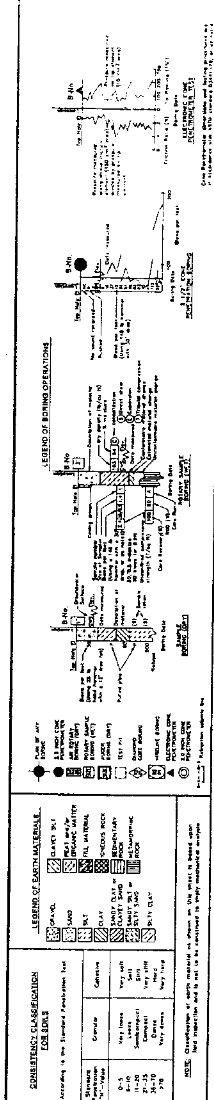
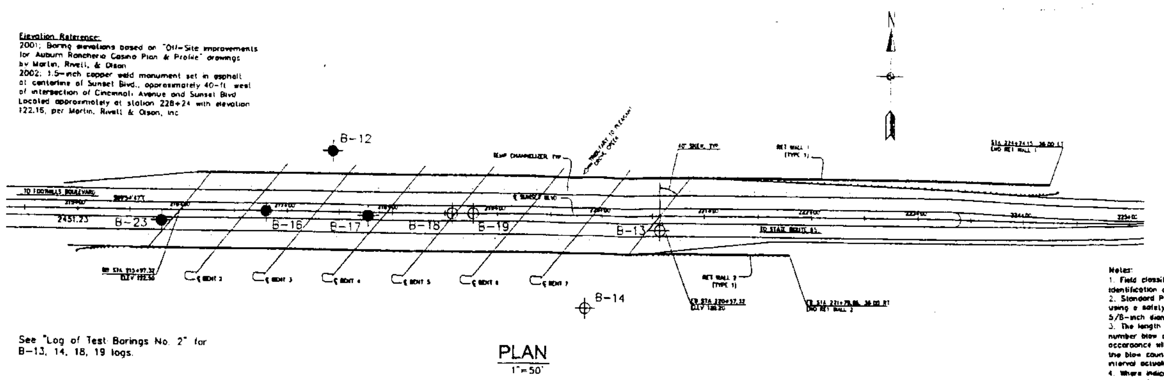
TABLE-1
Pile Data Table

Location	Pre-cast Prestressed Concrete Piles	Design Loading (service load) (Tons)	Nominal Resistance		Design Tip Elevations	Specified Tip Elevation
			Compression (Kips)	Tension (Kips)		
Abut-1	16 inch Octagonal	45	180	0	85.0 (1); 93.0 (3)	85.0
Bents 2-7	24 inch Octagonal	150	600	0	83.0 (1); 93.0 (3)	83.0
Abut-8	16 inch Octagonal	45	180	0	85.0 (1); 93.0 (3)	85.0

Pile tip elevation is controlled by the following demands: (1) compression, (2) tension and (3) lateral
Pre-drilling 16 & 24 inch diameter holes permitted to elev. 100.0 per Caltrans Standard Specifications, Sec. 49-1.05



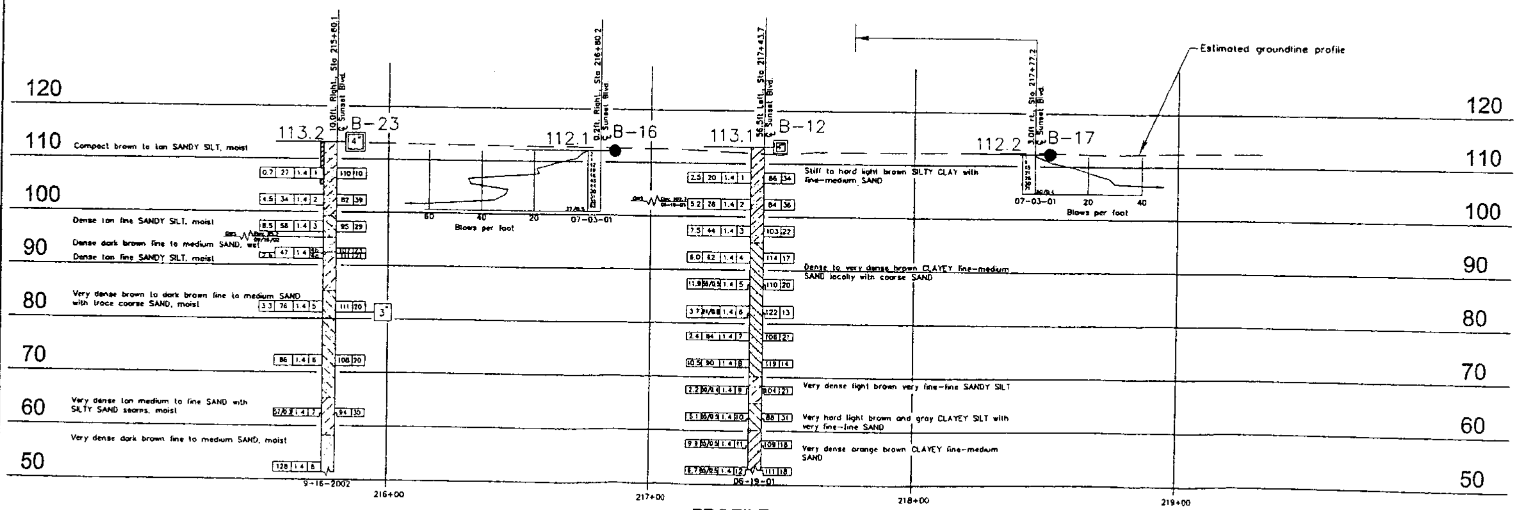
Elevation Reference:
2001: Boring elevations based on "Off-Site Improvements for Auburn Rancheria Casino Plan & Profile" drawings by Martin, Rivett, & Olson
2002: 1.5-inch copper weld monument set in asphalt at centerline of Sunset Blvd., approximately 40-ft west of intersection of Cincinnati Avenue and Sunset Blvd Located approximately at station 228+24 with elevation 122.15, per Martin, Rivett & Olson, Inc



See "Log of Test Borings No. 2" for B-13, 14, 18, 19 logs.

PLAN
1"=50'

Notes:
1. Field classification of soils was in accordance with ASTM D 2488-93 "Description and Identification of Soils (Visual-Manual Procedure)".
2. Standard Penetration tests were performed in accordance with ASTM D 1586-84 using a safety hammer operated with cat-head, rope and pully. Drill rods were 1 5/8-inch diameter "A"-rods; sampler was driven with brass liners.
3. The length of each sampled interval is shown graphically on the boring log. Whole number blow counts ("N") represent the "standard penetration resistance" interval in accordance with ASTM D1586-84. Where less than 1 foot of penetration is achieved, the blow count shown is for that fraction of the "standard penetration resistance" interval actually penetrated.
4. Where indicated by an asterisk (*) the number of blows shown is for only that fraction of the initial 0.5 ft. "seating drive" interval penetrated.
5. Consistency of soils shown in ( ) where estimated
6. Electronic media for plan view provided by Martin, Rivett, & Olson, received 9/11/02
7. Groundwater surface elevations in the borings indicated on the Log of Test Boring Sheets reflect the fluid level in the borings on the specified date.
8. Groundwater surface elevations are subject to seasonal fluctuations and may occur at higher or lower elevations depending on the conditions at any particular time



PROFILE
VERT. 1"=10'
HOR. 1"=20'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
3	Pla				

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

TABER CONSULTANTS
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West Sacramento, CA 95691

JOB No. 2P2/300/272-3 LOCATION 38121-C3 245N 186W

REGISTERED PROFESSIONAL ENGINEER No. 38782 EXP 3-31-05 CIVIL STATE OF CALIFORNIA

NO.	DATE	REVISION	BY
		DISREGARD PRINTS BEARING EARLIER REVISION DATES	

	BY	CHECKED
DESIGNED		
DRAWN	M. D. R.	M. W. M.
QUANTITIES		

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BRIDGE NO. | POST MILE

0 1 2 3
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K. R. Dohl
T. A. Krouse
R. C. Pickard
FIELD INVESTIGATOR
Jun/Jul 01 &
DATE Sept 02

PREPARED FOR:
MARTIN RIVETT & OLSON CONSULTING ENGINEERS
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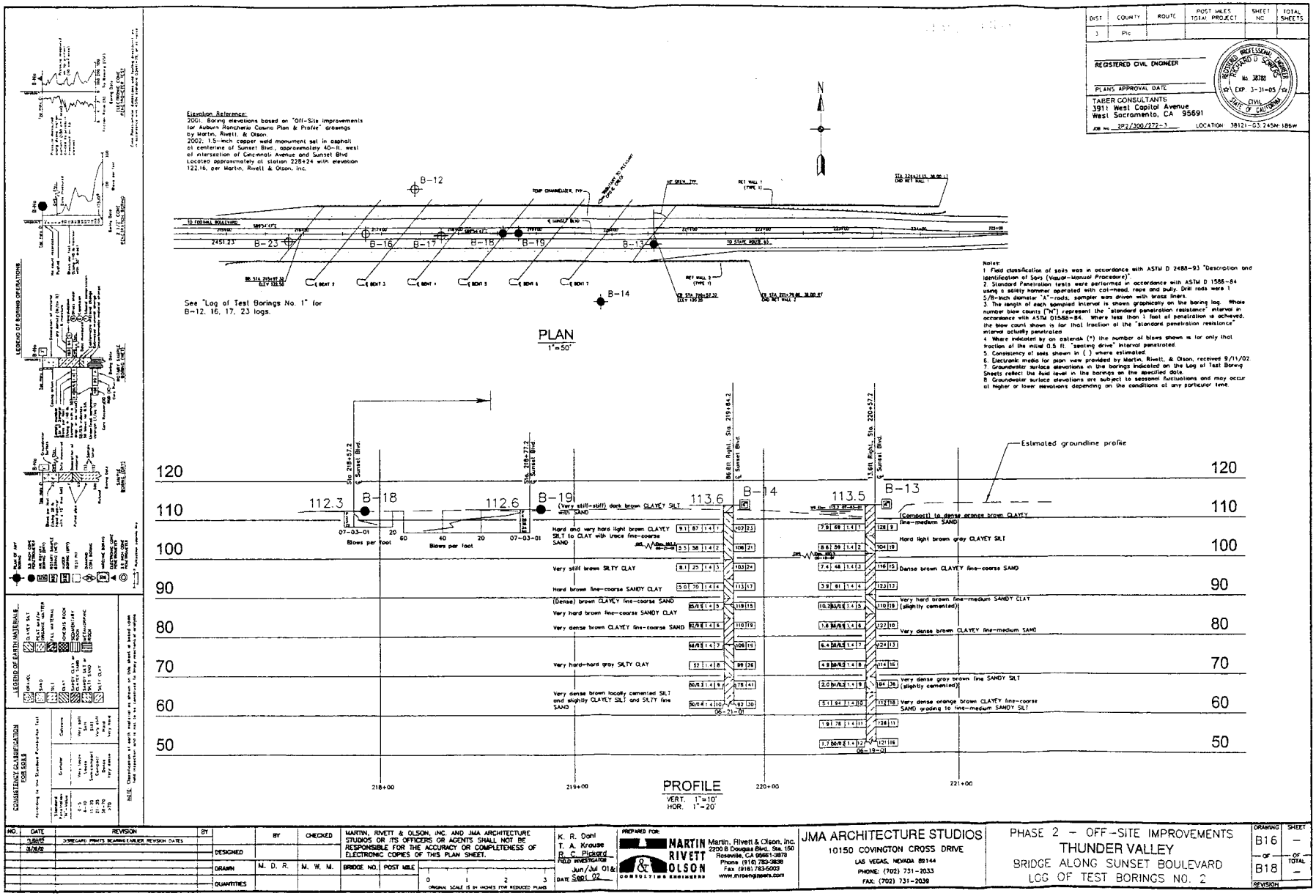
PHONE: (702) 731-2033
FAX: (702) 731-2039

PHASE 2 - OFF-SITE IMPROVEMENTS
THUNDER VALLEY
BRIDGE ALONG SUNSET BOULEVARD
LOG OF TEST BORINGS NO. 1

DRAWING B15 OF B18 | SHEET – OF TOTAL – | REVISION

H:\2000\20005 AR Casino\Boring\Cad Rev\20005B-LOTB1.dwg Jun 13, 2003-08:22 am



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
3	Plc				

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	8/28/02		

	BY	CHECKED
DESIGNED		
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T. A. Krause
R. C. Pickard
FIELD INVESTIGATION
Jun/Jul 01 &
DATE Sept 02

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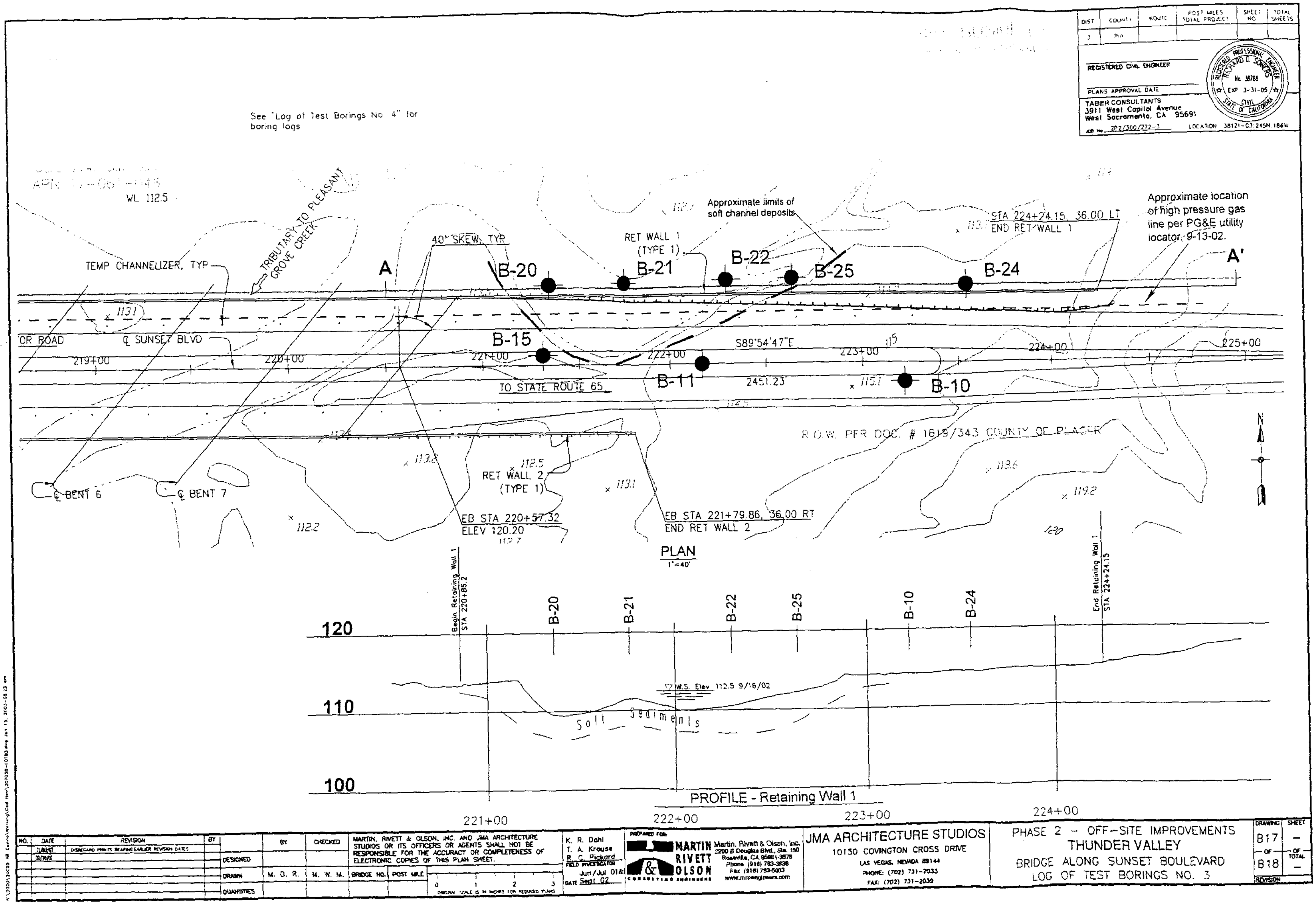
PHASE 2 - OFF-SITE IMPROVEMENTS
THUNDER VALLEY
BRIDGE ALONG SUNSET BOULEVARD
LOG OF TEST BORINGS NO. 2

DRAWING	SHEET
B16	–
OF	OF
B18	TOTAL
REVISION	–


See "Log of Test Borings No. 4" for boring logs
WL 112.5
TEMP CHANNELIZER, TYP
TRIBUTARY TO PLEASANT GROVE CREEK
40° SKEW, TYP
RET WALL 1 (TYPE 1)
Approximate limits of soft channel deposits
STA 224+24.15, 36.00 LT END RET WALL 1
Approximate location of high pressure gas line per PG&E utility locator, 9-13-02.
A
A'
B-20
B-21
B-22
B-25
B-24
B-15
B-11
B-10
OR ROAD
℄ SUNSET BLVD
S89°54'47"E
2451.23'
TO STATE ROUTE 65
R.O.W. PER DOC. # 1619/343 COUNTY OF PLACER
℄ BENT 6
℄ BENT 7
RET WALL 2 (TYPE 1)
EB STA 220+57.32 ELEV 120.20
EB STA 221+79.86, 36.00 RT END RET WALL 2
PLAN
1"=40'
Begin Retaining Wall 1 STA 220+86.2
End Retaining Wall 1 STA 224+24.15
W.S. Elev 112.5 9/16/02
Soft Sediments
PROFILE - Retaining Wall 1
120
110
100
221+00
222+00
223+00
224+00
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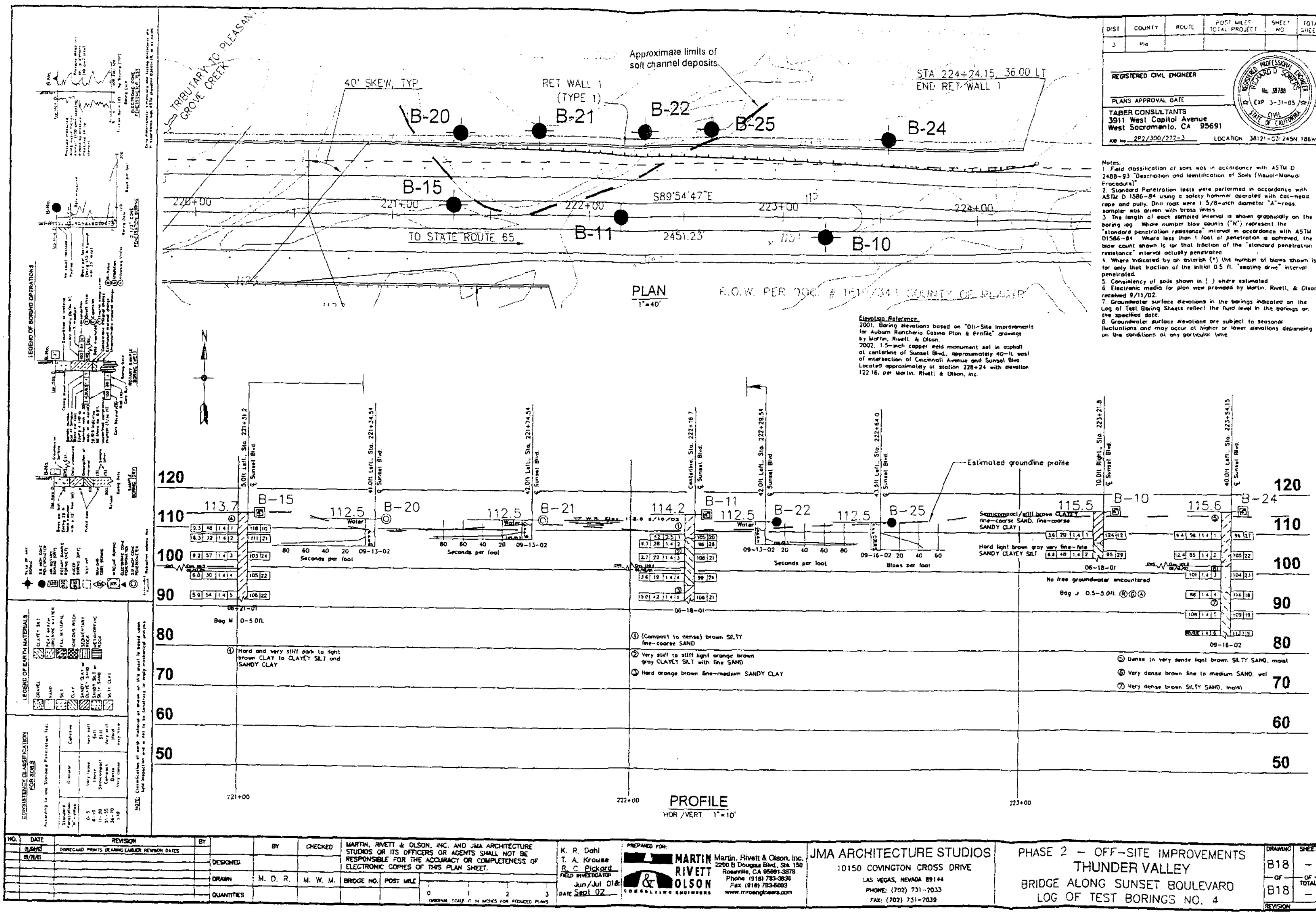
LOG OF TEST BORINGS NO. 3
B17
B18


Approximate limits of soft channel deposits
40' SKEW, TYP
RET WALL 1 (TYPE 1)
STA 224+24.15, 36.00 LT END RET WALL 1
TRIBUTARY TO PLEASANT GROVE CREEK
B-20
B-21
B-22
B-25
B-24
B-15
B-11
B-10
S89°54'47"E
2451.23
TO STATE ROUTE 65
220+00
221+00
222+00
223+00
224+00
PLAN
1"=40'
R.O.W. PER DOC. # COUNTY OF PLACER
Elevation Reference.
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5.0ft Left, Sta. 221+31.2 ℄ Sunset Blvd.
41.0ft Left, Sta. 221+34.54 ℄ Sunset Blvd.
42.0ft Left, Sta. 221+74.54 ℄ Sunset Blvd.
Centerline, Sta. 222+16.7 ℄ Sunset Blvd.
42.0ft Left, Sta. 222+29.54 ℄ Sunset Blvd.
43.5ft Left, Sta. 222+64.0 ℄ Sunset Blvd.
10.0ft Right, Sta. 223+21.8 ℄ Sunset Blvd.
40.0ft Left, Sta. 223+54.15 ℄ Sunset Blvd.
Estimated groundline profile
113.7
112.5
114.2
115.5
115.6
09-13-02
09-16-02
06-21-01
06-18-01
09-18-02
Seconds per foot
Blows per foot
Water
Bag M 0-5.0ft.
④ Hard and very stiff dark to light brown CLAY to CLAYEY SILT and SANDY CLAY
① (Compact to dense) brown SILTY fine-coarse SAND
② Very stiff to stiff light orange brown gray CLAYEY SILT with fine SAND
③ Hard orange brown fine-medium SANDY CLAY
Semicompact/stiff brown CLAYEY fine-coarse SAND, fine-coarse SANDY CLAY
Hard light brown gray very fine-fine SANDY CLAYEY SILT
No free groundwater encountered
Bag J 0.5-5.0ft.
⑤ Dense to very dense light brown SILTY SAND, moist
⑥ Very dense brown fine to medium SAND, wet
⑦ Very dense brown SILTY SAND, moist
120
110
100
90
80
70
60
50
PROFILE
HOR./VERT. 1"=10'
LEGEND OF BORING OPERATIONS
LEGEND OF EARTH MATERIALS
CONSISTENCY CLASSIFICATION FOR SOILS
DIST
COUNTY
ROUTE
POST MILES TOTAL PROJECT
SHEET NO
TOTAL SHEETS
3
Pla
REGISTERED CIVIL ENGINEER
PLANS APPROVAL DATE
REGISTERED PROFESSIONAL ENGINEER
No. 38788
EXP 3-31-05
CIVIL
STATE OF CALIFORNIA
TABER CONSULTANTS
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West Sacramento, CA 95691
JOB No. 2P2/300/272-3
LOCATION 38121-G3: 245N, 186W
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QUANTITIES
BY
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M. W. M.
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THUNDER VALLEY
BRIDGE ALONG SUNSET BOULEVARD
LOG OF TEST BORINGS NO. 4
DRAWING
B18
OF
B18
SHEET
TOTAL
REVISION

A-23